

What is claimed is:

1. A suction device for use in a cleaning apparatus that moves air, the device comprising:
 - a) A casing defining a substantially cylindrical cavity, the casing having first and end opposing ends and a first axis, the first end having an intake, and the second end having an exhaust,
 - b) A DC brushless motor contained within the cavity, the motor having a stator mounted to a shaft and the motor having a substantially cylindrical rotor mounted for rotation about the shaft, the shaft having a second axis and the shaft being fixedly mounted within the casing with the first and second axes aligned, and
 - c) An impeller fixedly mounted for rotation with the rotor, wherein rotation of the impeller in a first direction causes air to be drawn through the intake and expelled through the exhaust.
2. The suction device on claim 1, wherein the impeller is mounted between the rotor and the casing.
3. The suction device of claim 1, wherein the impeller is mounted about a reduced diameter portion of the rotor.
4. The suction device of claim 1, wherein the rotor has an adaptor extending from one end, and the adaptor has a reduced diameter from the remainder of the rotor.
5. The suction device of claim 3, wherein the reduced diameter portion is an adaptor that is mounted at one end of the rotor.
6. The suction device of claim 5, wherein the one end of the rotor at which the adaptor is mounted is closer to the intake than the other end of the rotor.
7. The suction device of claim 3, wherein the impeller comprises a centrifugal fan.
8. The suction device of claim 3, wherein the impeller comprises a multi-stage centrifugal fan.

9. The suction device of claim 1, wherein the casing has a diameter less than the depth of a wall stud of a conventionally framed structure.
10. The suction device of claim 1, wherein the casing has a diameter of 5 and 1/2 inches or less.
11. The suction device of claim 1, wherein the casing has a diameter of 3 and 1/2 inches or less.
12. A central vacuum cleaning system comprising the suction device of claim 1 and an air delivery apparatus, wherein the casing has a diameter less than the depth of a wall stud of a conventionally framed structure, and the device is mounted within a wall cavity between wall studs of a conventionally framed house, and air connection is provided between the intake and the air delivery apparatus.
13. The system of claim 12, further comprising a filter between the intake and the air delivery apparatus, wherein the filter prevents particles from entering the intake.
14. The system of claim 13, further comprising a particle receptacle between the filter and the air delivery apparatus, wherein a substantial portion of the particles are released into the receptacle from the air entering the intake before the air reaches the filter.
15. The system of claim 14, further comprising a first valve between the filter and the air delivery apparatus and a secondary exhaust between the filter and the first valve, the first valve having an open position to prevent air from passing through the first valve toward the air delivery apparatus and a closed position to permit air to pass through the first valve from the air delivery apparatus, the secondary exhaust for exhausting trapped particles from the filter when the first valve is closed.
16. The system of claim 15, wherein the rotation of the impeller in a second direction causes air to be drawn from the exhaust and to be exhausted through the secondary exhaust.

ART 34 AMDT

AMENDED CLAIMS

[received by the International Bureau on 10 September 2003 (10.09.2003)
Claims 23-28 have been added

17. The system of claim 16, wherein closing of the first valve and opening of the secondary exhaust causes air drawn from the exhaust to be exhausted through the secondary exhaust.
18. The device of claim 1, wherein the impeller is a set of fan blades substantially spaced equally about the rotor in an arc perpendicular to the first and second axes.
19. The device of claim 1, wherein the impeller is a plurality of sets of fan blades, each set of fan blades substantially spaced equally about the rotor in an arc perpendicular to the first and second axes, the sets positioned from one another along the first and second axes.
20. The device of claim 1, wherein the impeller is a plurality of centrifugal fans.
21. The device of claim 1, wherein the impeller is a squirrel cage fan.
22. A cleaning system comprising an upright vacuum cleaner with the suction device of claim 1 as a means for moving air through the cleaner.
23. A central vacuum cleaning system comprising the suction device of claim 1 and an air delivery apparatus, and air connection is provided between the intake and the air delivery apparatus.
24. The system of claim 23, further comprising a filter between the intake and the air delivery apparatus, wherein the filter prevents particles from entering the intake.
25. The system of claim 24, further comprising a particle receptacle between the filter and the air delivery apparatus, wherein a substantial portion of the particles are released into the receptacle from the air entering the intake before the air reaches the filter.
26. The system of claim 25, further comprising a first valve between the filter and the air delivery apparatus and a secondary exhaust between the filter and the first valve, the first valve having an open position to prevent air from passing through the first valve toward the air delivery apparatus and a closed position to permit air to pass through the first valve from the air delivery apparatus, the secondary exhaust for exhausting trapped particles from the filter when the first valve is closed.

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27. The system of claim 26, wherein the rotation of the impeller in a second direction causes air to be drawn from the exhaust and to be exhausted through the secondary exhaust.
 28. The system of claim 27, wherein closing of the first valve and opening of the secondary exhaust causes air drawn from the exhaust to be exhausted through the secondary exhaust.

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